

We claim:

1. A method of forming visible light sources with up conversion materials,
comprising the steps of:
 - 5 generating near infrared light from a source; and
 - upconverting the light through a mixture of upconversion materials into a visible
light emission; and
 - reflecting the visible light emission for at least one of a general lighting source or
a decorative lighting source.
- 10 2. The method of claim 1, wherein the generated near infrared light is emitted from a
diode laser.
3. The method of claim 2, wherein the diode laser includes an approximately 970 to
15 approximately 980 nm diode laser source.
4. The method of claim 1, wherein the upconversion materials are encapsulated in p-
PMMA.
- 20 5. The method of claim 1, wherein the visible light emission includes: red light.
6. The method of claim 1, wherein the visible light emission includes: green light.
7. The method of claim 1, wherein the visible light emission includes: blue light.

8. The method of claim 1, wherein the visible light emission includes: white light.
9. The method of claim 1, wherein the mixture of upconversion materials includes:
5 yttrium fluoride (YF₃) doped with ytterbium (Yb) and erbium (Er).
10. The method of claim 1, wherein the mixture of upconversion materials yields
emissions with peaks at approximately 540nm and approximately 660nm.
- 10 11. The method of claim 1, wherein the mixture of upconversion materials includes:
rare-earth material.
12. The method of claim 1, wherein the mixture of upconversion materials includes:
ytterbium-erbium.
- 15 13. The method of claim 1, wherein the mixture of upconversion materials includes:
ytterbium-thulium.
14. The method of claim 1, wherein the reflecting step includes the step of:
20 reflecting the visible light emission into a room light source.
15. The method of claim 14, wherein the room light source is a portable lamp for use
on one of a table or floor.

16. The method of claim 14, wherein the room light source is a ceiling suspended drop light.

17. The method of claim 14, wherein the room light source is a wall supported light.

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18. The method of claim 1, wherein the reflecting step includes the step of:
reflecting the visible light emission into a pool or spa.

19. A method of forming visible light using upconversion comprising the steps:
10 providing near-infrared light; and
upconverting the near-infrared light to the visible light spectrum with a rare-earth-doped crystalline host; and
applying visible light spectrum as a general lighting source or decorative lighting source

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20. The method of claim 19, wherein the visible light spectrum includes: visible red light.

21. The method of claim 19, wherein the visible light spectrum includes: visible green
20 light.

22. The method of claim 19, wherein the visible light spectrum includes: visible blue light.

23. The method of claim 19, wherein the visible light spectrum includes: visible white light.

24. The method of claim 19, wherein the rare earth doped crystalline host includes:

5 NaYF₄ doped with Er and Yb.

25. The method of claim 19, wherein the rare earth doped crystalline host includes:

YF₃ doped with Er and Yb.

10 26. The method of claim 19, wherein the rare earth doped crystalline host includes:

YLiF₄ doped with Tm and Yb.

27. The method of claim 19, wherein the rare earth doped crystalline host includes:

YF₃ doped with Tm and Yb.

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28. An upconversion visible light source for general and decorative lighting,
comprising:

means for generating near infrared light from a source; and

upconversion materials for upconverting the light into a visible light emission;

20 and

means for reflecting the visible light emission into at least one of a general
lighting source or a decorative lighting source .

29. The upconversion visible light source of claim 28, wherein the generating means includes: a laser diode.

30. The upconversion visible light source of claim 28, wherein the upconversion
5 materials include: rare earth doped crystalline host particles mixed within encapsulation materials.

31. The upconversion visible light source of claim 30, wherein the visible light emission includes: visible white light.

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32. The upconversion visible light source of claim 30, wherein the visible light emission includes: visible red light.

33. The upconversion visible light source of claim 30, wherein the visible light
15 emission includes: visible green light.

34. The upconversion visible light source of claim 30, wherein the visible light emission includes: visible blue light.

20 35. The upconversion visible light source of claim 30, wherein the at least one of the general lighting or decorative lighting sources includes: a portable lamp for use on one of a table or floor.

36. The upconversion visible light source of claim 30, wherein the at least one of the general lighting or decorative lighting sources includes: a ceiling suspended drop light.

37. The upconversion visible light source of claim 30, wherein the at least one of the
5 general lighting or decorative lighting sources includes: a wall supported light.

38. The upconversion visible light source of claim 30, wherein the at least one of the general lighting or decorative lighting sources includes: a wall reflecting light source for a pool or spa.

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